AVIATION

The Oldest American Aeronautical Magazine

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VOLUME XX **NUMBER 25**

SPECIAL FEATURES

ADAPTATION OF THE RADIAL ENGINE

ON THE CONTROL OF AIRPLANES AT LOW SPEEDS

AIR SERVICE TRAINING IN THE ARMY

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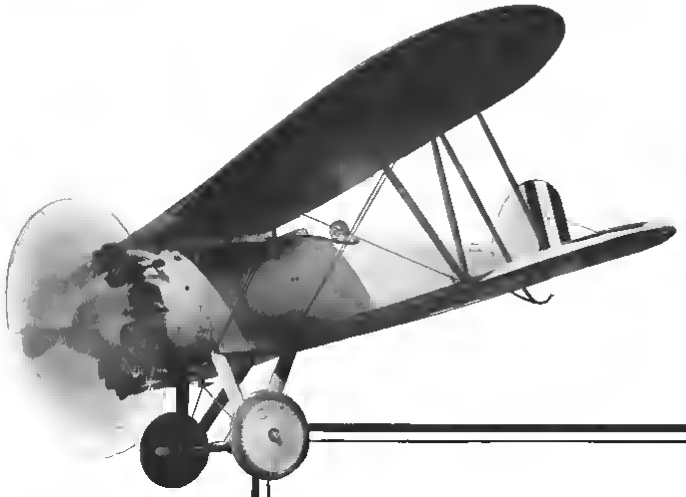

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JUNE 21, 1926

AVIATION

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Professional Pilots

AERONAUTICAL INTERESTS are divided into a number of different groups such as military manufacturers, civilian manufacturers, airline operators and professional pilots. These groups, of course, have common interests but they also have certain specialized problems which interest themselves especially and which are not of great interest to the other groups. The professional pilots probably have greater community of interests and less competition within the group than any of the other divisions, and it would seem as if there is considerable justification for an organization which would tend to unite the pilots and present their point of view on many matters.

Any professional pilot's association would naturally want to boost and promote aviation in general, but the solution of the problems which especially affect commercial pilots would be the real reason for the existence of the organization. For example, with the passing of the civil aviation bill there are to be drawn up a series of regulations regarding the licensing of pilots which will be of extreme importance to every professional flier. Those concerned should be able to present an intelligent and united viewpoint on the problems involved. In the matter of employment certain standards of wages and conditions of work should be in force. In the testing of new planes, and other flying where special risks are involved, pilots should stand together and not do an important job for a very low price just because they need a little ready money.

There are several organizations of professional pilots, notably in California and in Chicago. In many other places small groups of fliers get together for informal weekly or bimonthly dinners, swap stories and discuss the various problems which confront them. The closer coordination of these groups and the formation of a permanent national organization might require too much work and be too expensive, and it would probably not bring about sufficient results to make it worthwhile at this time. The idea of periodic meetings of professional aviators of a locality is, however, excellent and can be used even in small communities. There need be no dues nor regular organization, but getting acquainted with what the other chap is doing and what his views are enables the professional pilot to help himself and also to guide other aeronautical efforts in the community. If the local groups would appoint representatives the National Air Races would give an excellent opportunity to get together and discuss their problems and the possibilities of forming a National organization. AVIATION would be glad to hear from pilots as to their views on this subject.

Important Legislation

THE WINTER of 1925-1926 will be recorded as the most important in the history of peacetime American aeronautical legislation. For several years past the House, the Senate and the executive branch of the federal government have been conducting a series of investigations into the problems which confronted the development of aeronautics in this country. The investigations have been exhaustive and the reports have filled volumes. Last winter the higher officers of the Army and Navy air services and the leaders of the industry spent much, if not all, of their time in preparing data and giving testimony before the various investigating bodies. Much of the work seemed long, drawn out and futile, but tedious as the work seemed, it resulted in arousing the country to the needs of aviation and gave to Congress at least a rudimentary idea of the problems involved. This year Congress has formulated a policy for the development of aviation as far as it can be fostered by federal legislation.

The first law to be passed was that governing civil aviation. A general policy has here been laid down and the administration of the act will be of immense importance to the development of civilian aviation. The law and discussions and comments on it have been printed in previous issues and should be studied with the greatest care by all those interested in aviation.

The situation surrounding the proposed five year building programs for the Army and Navy has been much more complex. Both the Senate and the House drew up bills which were quite different in their character. Various committees have been at work and changes have occurred from day to day, making the facts difficult to follow and impossible to clearly set forth in a weekly publication. The Senate and House bills for the Army Air Service and Naval Aviation are now being reconciled in conference and it is practically certain that the bills will become law at this session of Congress.

On the whole the bills are conservative and follow the general lines of the Morrow report. The main discussion has been on the question of competitive bidding and the appointment of commanding officers from the flying services instead of from other branches of the Army or Navy. Advocates of a separate air force, or of a complete and radical reorganization of the services, will be disappointed with the legislation. There is no doubt, however, that the legislation will make a very distinct step forward in the status of military aviation. It will correct many obvious faults and provide a real development program for the next five years.

The Army bill authorizes the building of 1,800 planes and a number of airships; the Navy bill authorizes the building of 1,947 planes and two rigid airships. It is estimated that the Army bill which includes the personnel of the Army Air Corps will cost $40,000,000 annually, while the Navy is authorized to spend $18,000,000 annually for construction. These are large important sums. The air services and the industry are now assured of an opportunity to show what they can do. If the period is one of accomplishment and not of talk an immeasurable improvement in the status of American aviation will result.

Adaptation of the Radial Air-Cooled Engine

The Special Problems of Installation of Air-Cooled Radial Engines.

By ROBERT W. A. BREWER
Pitcairn Aviation Inc.

IN THIS Article consideration will be given to the general scheme of mounting the air-cooled radial engine in the airplane fuselage to the best advantage, together with such parts as comprise the engine group. The design and the work involved may, at first sight, be considered to be that of the airplane engineer rather than a power plant job, but this is not the case. Rather is it one of co-operative effort. The correct mounting and grouping of the parts in the front of the fuselage is most important when an air-cooled radial engine is used, and does not simply involve placement in correct location as indicated from the weight distribution calculations. Water-cooled power plants have had much time and thought placed upon them with regard to installation, but it does not hold good that conclusions in one case apply with equal force in the other.

Failure Due to Installation

It has previously been noted that proper installation of radial air-cooled engines, or rather the lack of it, was a prolific cause of failure in the early days. It is only comparatively recently that we have fully understood the laws governing air flow and even now there is much that is obscure, but we do know full well that in the problem of air-cooling it is as important to get air away from an object as it is to drive air toward it. A simple experiment will illustrate the point. Take a candle or other feeble source of flame, and a flat fan. Approach the flame rapidly with the fan, and you will find that there is scarcely any perceptible effect. Now start with the fan close to the flame and draw it away rapidly. The flame will go out. The lesson learned is that, in arranging the installation of an air-cooled engine, proper means must be provided for getting rid of the hot air readily.

As the type of engine under discussion has so much in its favor with regard to cost of production, ease of overhaul, accessibility, etc., none of these advantages should be minimized by fitting an unsuitable mount and every consideration should be given to this aspect of the subject. There is, at present, no standardized method of mounting. Similar airplanes use different mounts and because the possible adaptations are so wide, we cannot, at this period, set up a standard, and must be content with certain points for guidance.

The engine maker requires that:—

(1) The mount should be light and strong enough to support the engine without suffering from serious deflection under working conditions. It should be properly braced in all bays.

(2) It must be rigid in itself to withstand the torque variations in the engine and any periodic vibrations in the mounting must not synchronize with any that the engine may have throughout its working range of speed.

(3) The mounting must not set up stresses in the crank case or in the ends of the fuselage. If attached by pins to the fuselage, the pins should have very ample bearing surfaces and preferably be tapered and ground.

(4) A spigot mounting plate, if used, should be true and a good fit.

(5) There should be no interference with the accessibility of those parts or details which are likely to require attention periodically. The complete removal as a whole, of the engine and mounting or engine only, should be readily possible. This should only necessitate the disconnection of a few oil, gasoline lines, and the tachometer drive.

A few details, due to Roy Fedden, designer of the Jupiter engine, are valuable and instructive with regard to weights. The following figures relate to the same airplane with different engines:

	RADIAL AIR COOLED		WATER COOLED		
		a.	b	c	d
Lb. per h.p. (Total installed weights)	2.00	2.89	3.21	2.74	3.85
Per cent per h.p. of weight of installation	100	144.5	160.5	137	187.5

Another tabulation gives valuable details of the weights of mountings and cowlings:

	hp	type	lb. /h.p. mounting	lb. /h.p. cowling
two seater	300	5 cyl. W.C.	186	116
two seater	240	5 cyl. W.C.	22	125
two seater	220	12 cyl. W.C.	144	150
two seater	200	5 rad. A.C.	062	040
twin engine	380	5 rad. A.C.	067	073

In small machines, the advantage of possible weight reduction can be fully taken to the radial engine for this is a favorable opportunity. Generally, we find that some form of ring is provided for the immediate attachment of the engine. The ring is supported from the front of the fuselage by a system of struts suitably triangulated to give stiffness to the

Capt. Robert W. A. Brewer

structure. Thus, the engine can be held away from the fire bulkhead a sufficient distance not only to give free access to the accessories mounted at the rear of the engine, but also to provide enough room for the heated air to be led away in a free manner. In some installations a four point support is given to the ring by tubular members, while in others, where production quantities are considered, pressings of steel or duralumin provide a suitable and workmanlike set of supporting arms. In some arrangements the mounting ring is removable with the engine, while in others the ring forms part of the structure and the engine is removable from it.

The swinging form of front mount is sometimes employed and, although it has not come generally into favor, it shows possibilities. The Koolhoven type of swinging mount looks like a neat job and nothing could be more convenient from the point of view of accessibility.

When a radial engine is used as a replacement on a plane designed originally for a straight-line engine, the required center of gravity position of the plane automatically calls for a considerable space between the rear of the engine and the fire bulkhead. We are thus led to the question of a suitable cowling.

Generally, with radials as designed at this time, the forward part of the cowling can be a more or less permanent structure, as the position of the major accessories is usually at the rear. Many radials are designed so that the front cover plate gives a good entrant form and scarcely requires a fairing. When this is so, oil cooling by the slip stream can be taken advantage of. The writer lays some stress upon this point as the difficulty of cooling oil in the bulk or flowing form is well known. When spray can be treated we have much better conditions for oil cooling and the interior of the front nose would be the logical place in which to effect the purpose in view.

The rear part of the cowling must have easily removable panels between the engine mounting proper and the fire bulkhead. These should have proper stiffness and be so designed that local stresses are not set up as such as would cause fracture due to vibration. Generally, this part of the cowling must, in the first instance, be made on the job. The design of proper catches or fasteners leaves much scope for the designer. They should be readily detachable and preferably be some form of safety catch which will stay in place and which can be sunk into suitable depressions in the plates.

Cowling and Cooling

As to the extent of the cowling and the amount by which it should cover the cooling fins on the engine, much depends upon the kind of general service which the plane will have to fill. Where much ground work and taxiing has to be done, the maximum air accessibility is desirable. Even a supplementary small air propeller to throw air onto the center portion of the disc, is not out of the question. On the other hand, some engines are too much cooled, so that almost complete cowling has been resorted to.

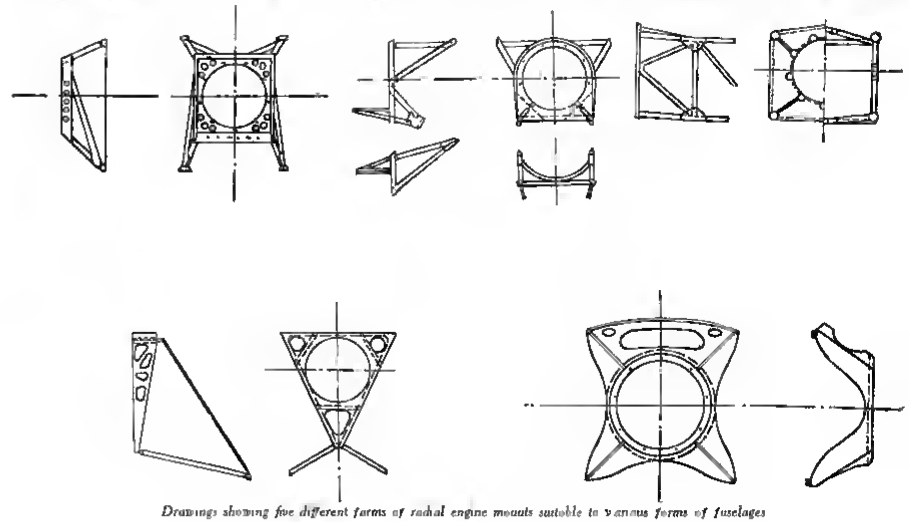
There is an intermediate, and very successful system where helmet cowls are provided for the individual cylinders. They have small front vizors and proper outlets at the rear. It is quite feasible to carry out some scheme such as this not only for individual cylinders but for the engine as a whole. Racing motor car practice has taught us something about induced air flow and this can be taken advantage of in the cowling of radial cylinders.

Combined with the matter of cowling, the handling of the exhaust is very important. There are two main considerations here,—nuisance from the noise and prevention of fire. It is apparently a moot point whether the provision of an exhaust ring manifold does or does not diminish fire risk. However, in the writer's opinion, much depends upon how the stack pipes leave the engine. Certainly the further they are from the carburetor inlet the better, as flame from the exhaust is very readily drawn into the carburetor inlet if it comes at all near to it. Short stack pipes must be a nuisance to the pilot, particularly in the dusk, and modern progress calls for some form of silencing the noise. Probably the best place for a ring manifold is in front of the engine and as near to the center as conditions will permit. The design of a suitable system has been full of difficulty and Mr. Fedden tabulates some desiderata in this connection.

1. Light weight and the lowest drag possible.
2. The system must be of sufficient volume not to cause back pressure and damage to the valves.
3. There must be no sharp bends and the gases must not play directly upon any part of the expansion chamber.
4. The pipes from the individual cylinders leading to the main chamber must be provided with flexible joints to allow for expansion of the cylinder heads.
5. Welding is to be used as little as possible and if necessary, riveting should be used as well.
6. The system, as a whole, must be sufficiently rigid to withstand any serious distortion and robust enough for long service.
7. The design must be such that it can be produced economically by press tools and jigs.
8. The material must be such that it will resist corrosion.

Materials for Manifolds

As regards material, wrought iron seems to hold out the most promise. The design must be worked out between the engine designer and the airplane designer. The general conclusions seem to point to the fact that the exhaust outlet from the engine should be at the side of the cylinder, as from this location the stub pipes can be led forward. At the same time, proper air-cooling of the valve seats can be had, which is difficult where the pipes lead out directly forward from the cylinder block. Outlets from the exhaust ring can conveniently be two in number,—one on either side near the bottom. By this arrangement they can be led away from the carburetor and follow the lines of the fuselage. It would seem that some good form of ring manifold could be devised so that



Drawings showing five different forms of radial engine mounts suitable to various forms of fuselages

further silencing would not be necessary. This has proved to be the case with racing motor car engines.

Reviewing the situation as a whole, there should be no great difficulty in fairing a radial engine,—even in the crudest forms. The performances of similar planes fitted with in-line and radial engines generally show in favor of the radial. This may, at first, seem incredible but it is a fact. The somewhat larger frontal area of some radials than that of equal powered in-line engines would seem to militate against an equal parasitic resistance, but this does not appear to be the case in actual practise.

There is one other point, in conclusion, which should receive notice. That is, the matter of oil cooling. Most radials are partly oil cooled, the importance of transmission of heat to the oil is becoming more and more appreciated. Some engineers believe that the largest quantity of oil possible should be used. Some of the heavily loaded bearings of the radial can only be kept working to the best advantage by a free circulation of oil. Although the specific heat of oil is low as compared with water,—less than half,—oil is very stubborn in giving up its heat. Perhaps one the reasons is that, when the temperature on the outside of the cooler is much lower than that of the oil, a viscous layer is formed on the oil wetted side of the cooler tubes or surfaces which acts as an insulator. Oil coolers should be so designed, therefore, that such a layer cannot form either by producing a scrubbing flow of liquid along the surfaces or by providing very large surfaces at small temperature difference. Tubular oil coolers placed in the slipstream are not very satisfactory. The writer prefers to diffuse the oil and to cool the spray. This should meet the requirements.

A Litchfield Trophy Misunderstanding

Owing to the fact that the regulations for the deed of gift, covering the Litchfield Trophy, had not been completed in 1924, at the time the National Balloon Race was held, the first official competition for the cup did not take place until 1925. The Akron Chapter won the trophy that year and also in 1926, but it will not become the permanent possession of that organization unless it is again won in 1927.

Considerable confusion has arisen through erroneous newspaper reports and the National Aeronautic Association wishes to make it clear that not only must the trophy be won a third time, but that it goes to the chapter or other organization, under whose auspices the winning balloon has been entered, and not to the individual pilot.

Cohham Plans Flight to Australia

Alan J. Cobham, Great Britain's premier airman, announces that he will soon make a flight to Australia and back, using the same airplane which figured in the Rangoon and Cape Town flights, with the addition of a new standard Jaguar 385 hp. engine.

Mr. Cobham's object in making the flight at this time is to prove that flying is practicable throughout the year. In order to uphold his contention, he has selected the difficult monsoon season. The route has not yet been decided upon. From Rangoon he may go to the southern part of Burma and across to Bangkok, thence to Singapore, or via Penang and on by Java to Port Darwin, flying by Cloncurry, Charleville, Sydney and Melbourne, Australia. The total flying distance will be approximately 26,000 miles.

Cape Town-Cairo Flight Ended

The flight from Cape Town to Cairo and back, undertaken to establish closer relations between England and her colonies in Africa, was completed June 5 on schedule time and without accident. Fifty stops were made during the flight and a distance of 11,000 mi. was covered.

The four Royal Air Force fliers, who participated, will continue the journey to England.

Fairchild-Caminez Engine Scintilla Equipped

In an article describing the Fairchild-Caminez four cylinder air-cooled radial commercial engine, in the May 24 issue of AVIATION, mention was made of the different items of engine equipment but the type of magnetos used was not identified at the time. It is of interest to note that two type AP-4 Scintilla aircraft magnetos with two spark plugs per cylinder are used on this new engine.

Glider Flies for 9 hr.

A motorless glider, piloted by Ferdinand Schulz, with a passenger on board, remained in the air 9 hr. 21 min. on June 3, nearly doubling the previous record. Schulz and his companion performed this feat at Rositten, near Koenigsberg, Germany, starting at 4:52 o'clock in the morning and landing at 2:13 o'clock. The glider Goethen also made the previous record of 5 hr. 40 min. last year, piloted by Selker-Chemnitz.

Air Service Rapid Photogaphy

During the Summer meeting of the Society for Automotive Engineers, held during the week of May 31 at French Lick Springs, Ind., a new process for the rapid taking of aerial photographs was publicly demonstrated by the Air Service for the first time. In ten minutes a picture, showing members and guests grouped to form the letters S A E., was exposed, developed and finished in an airplane from McCook Field and dropped to earth by parachute. A few hours after the picture was taken, a lantern slide of it was exhibited at an evening session of the meeting.

The living S.A.E. insignia photographed by the Army Air Service at French Lick Springs

The plane was flown by Lieut. G. L. Goddard and Dr. S. M. Burka operated the camera.

Fairchild Now Represented in Buffalo

Ronne and Washburn, who have operated an aerial service in and around Buffalo, N. Y., for several years, are now associated with the Fairchild Aerial Surveys Inc., according to Sherman M. Fairchild, President of the latter company. Under the new management, Ronne & Washburn will do the flying in the vicinity of Buffalo and the Fairchild Company will do the photographic and mapping work.

E. M. Ronne is in charge of the Municipal Airport in Buffalo in addition to his other activities. He and his partner also are kept busy testing parachutes. Fairchild officials are confident that by establishing this connection they are now in an excellent position to execute rush photographic jobs satisfactorily in that section.

Model Air Enthusiasts

The Aviation Club of Wyandotte, Mich., invites correspondence with other clubs and model builders who are interested in small model machines and flying them.

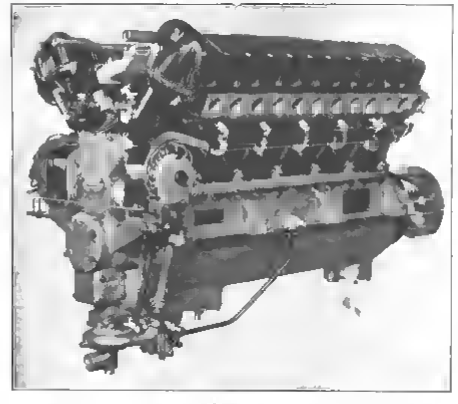
Address all correspondence to Donald Campbell, c/o Roosevelt High School, Wyandotte, Mich.

The Curtiss D-12 Engine in Gt. Britain

The Curtiss D-12 Engine Passes Air Ministry 100 Hr. Test and is Accepted and Approved for Use in British Military Aircraft.

IMMEDIATELY AFTER the 1923 Schneider Cup Race at Cowes, England, in which first and second places were taken by Curtiss racers equipped with the Curtiss D-12 engine, the British Government became interested in the D-12 engine, and purchased two for test purposes. Shortly thereafter, the Fairey Aviation Co. Ltd. of Hamble, England, following a far-sighted policy of obtaining for England the finest power plant available, and acting entirely on its own initiative, entered into a preliminary contract with the Curtiss Company for the manufacture and sale of the D-12 in England. This company promptly designed, manufactured, and submitted to the British Air Ministry the Fairey Fox, a two-seater observation plane built around the D-12 engine.

The performance of the Fairey Fox astonished the Air Ministry, and in spite of considerable opposition and pressure from other British manufacturers, an order was placed for a substantial number of these planes, to be equipped with D-12 engines. The order, however, was contingent upon the D-12 successfully passing the 100 hr. type test, which, under British methods, far exceeds in severity any test yet imposed upon aeronautical engines.



The Curtiss D-12 engine

A D-12 engine was accordingly prepared for the test and shipped to England coincidently with a number of stock engines.

After all the preliminary power runs and inspections had been completed, the test engine ran 87 hr. when a small screw in an oil pump gear worked loose and interfered with the oil system. While this was recognized as purely an accessory difficulty, nevertheless the rules governing the tests are ironclad, and the decision was announced.—"Tests not completed—engine not approved."—

To meet its scheduled deliveries on the Fox, the Fairey Company was faced with the necessity either of substituting another type of engine in the Fox, or of immediately presenting another D-12 for test. An exchange of cables indicated that the Curtiss Company, because of its American Government orders, could not make immediate delivery of a new test engine. The Fairey Company therefore, at the recommendation of the Curtiss Company, presented for test a stock production D-12 engine, from the original lot received in England.

An unforseen circumstance which added to the severity of the test was the fact that the Fairey Company desired, in the Fox, the greatest available horsepower, and, therefore, all the engines on hand, including the one submitted for the second test, were of the high compression type, developing some 30 horsepower more than the standard service engine. And high compression engines, of course, are supposedly more susceptible to mechanical ailments than low compression ones. Furthermore, no allowances could be made for the differences in specifications between American and British practice, which meant that the D-12, to be approved, had to operate under conditions for which it was not primarily designed. These facts must be realized in order to properly gauge the remarkable performance of the D-12.

The second test was a complete success, and the British Air Ministry officially accepted the engine and approved it for use in British military planes. While no official report, other than that the engine has been approved, has been received here, preliminary indications are that the test was a revelation to the British experts. It is said that the engine dropped only 2½ hp. in the 100 hr. run, showed uniform fuel and oil consumption, (the oil consumption being particularly low) and on being torn down for inspection, was found to be in beautiful condition.

A World-Wide Standard

The acceptance of the D-12 engine by the British Air Ministry represents the first concrete recognition of an American aeronautical engine by a European power since the World War. This, together with the fact that all the other important European governments are now looking to England for their advanced engine design, places the D-12 in a perfectly favorable position.

The engine, which will be known in England as the Fairey Felix, will probably go into single-seater pursuit and two-seater place fighter airplanes, in competition with planes powered with British air-coolrd engines.

The question of the relative superiority of water-cooled and air cooled engines for this type of service is still an open one. During recent years the British have been developing the air-cooled pursuit, while the American Air Services have been fostering the development of the water-cooled D-12 pursuit. It is interesting, therefore, to note that now the British may adopt the water-cooled D-12 pursuit, and our Naval engineers are seriously experimenting with the air-cooled type.

Aircraft Exports

The Department of Commerce, Bureau of Foreign and Domestic Commerce, announces the following domestic exports of aircraft and engines, from the United States, for the month of March:

Countries	Engines for aircraft: Number	Engines for aircraft: Dollars	Airplanes, seaplanes, and other aircraft: Number	Airplanes, seaplanes, and other aircraft: Dollars	Parts, except tires: Dollars
Soviet Russia in Europe	15	36,000	–	—	1,530
Canada	1	25	1	1,250	2,985
Mexico	1	2,000	–	—	528
Brazil	–	—	1	50	—
Total	17	38,025	2	1,300	4,678

New Western Airplane Corp. Plane

The Western Airplane Corporation of Chicago announce a recent development in airplanes, known as the King Bird. This is the result of considerable experiment, the production of the new W.A.C. wing section being one of the features of the design.

Three of these planes are being built for the Chicago Flying Club.

On the Control of Airplanes at Low Speeds

Supporting Existing Control Methods as Adequate for Control Under All Conditions.

By B. V. KORVIN-KROUKOVSKY

IN THE MAY 31 issue of AVIATION, W. L. LePage raised again the ever acute question of controlling airplanes at low speeds, at the angles of attack above stalling. In a very interesting review, he explains that control surfaces of present airplanes, in particular the tail surfaces, being nothing but minor aerofoils themselves, stall at the same time as the wing stalls, and leave the pilot in a most disconcerting manner without any means of control. Considering the lateral control, the conditions are still worse. The ailerons may actually cause the burbling of the wing tips set near stalling angle, says Mr. LePage, and instead of righting the airplane, as the pilot naturally expects, they send it into a tail spin. Such being the state of affair with present methods of control, Mr. LePage gives us some suggestions on different unorthodox methods supposed to control the airplane efficiently at the angles of attack way beyond stalling.

Present Methods Discussed

Being for several years connected with practical design and construction of airplanes, I feel that it is only fair toward the present methods of control and toward their designers to put forth some argument for their defense. Let us begin with the longitudinal control, and let us consider in more detail the action of the tail plane in an airplane. Fig. 1 shows an elemental airplane balanced as they used to do it in the early days of aeronautics with the center of gravity located between 40% and 50% of the chord. As the center of pressure on the wing surface at the stalling angle is located around 30 percent of the chord, the tail plane has to support a portion of the load, for which purpose it must be set at an angle of attack δ. The continuous lines on the diagram show the streamlines of the air just before the stall. The dotted lines show the same streamlines after the stall. As the lift coefficient of the wing *decreases* after the burbling point is passed, the angle of downwash *must decrease also*. It is evident from the sketch, that this leads to a sudden and considerable increase of the angle δ. Consequently, the tail plane, which was already on the point of stalling, is caused to burble even more suddenly than the wing does, and the tail drops down, thus aggravating the stall. This has actually happened in case of Farman pusher biplanes of 1912 which, when stalled, used to drop their tails in very much the same

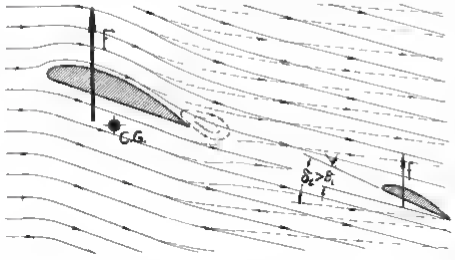


Fig. 1.

manner as the present day airplane drops its nose. This type of airplane clearly possesses all the undesirable features pointed in Mr. LePage's discussion.

Let us consider now Fig. 2, showing the airplane balanced according to present day requirements, in such a way, that the center of gravity is located ahead of the center of pressure. In this case evidently the tail plane will be subjected to a down load, and its angle of attack δ will be negative. As the wings of this airplane burble, and the angle of downwash is, therefore, diminished, the angle δ will be increased algebraically and probably will be changed from the negative to the positive value. This, of course, will cause the "tail to rise, thus bringing the airplane again to an angle of attack below stalling". Thus, the correctly balanced airplane, when stalled, will drop its nose, and will regain its flying speed. It will do it the more abruptly, the more suddenly the wing

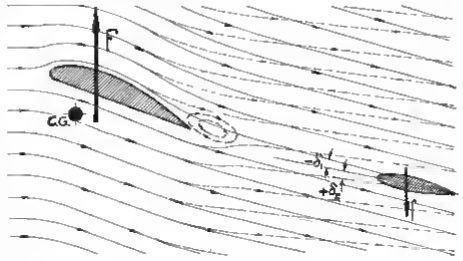


Fig. 2.

will burble. The pilot will lose control in a sense that he will not be able to prevent the machine from returning to a safe flying speed. The abruptness of this maneuver will "depend solely on the aerodynamic characteristics of the aerofoil used for wing" surfaces. The sharper the peak of the lift coefficient curve, the more abruptly will the wing burble, and the more abruptly will the nose be dropped. As a concrete example, we can mention the HS-2L flying boat, which has the center of gravity located at 25% of the chord, and "is equipped with wings of R.A.F.6 section. Once stalled, this machine drops its bow, and dives for some 200 ft. before the elevator control is regained. This is to be expected in the case of thin wing burbling rather suddenly." On the other hand, wings of thick or high lift variety are known to possess a well rounded peak of the lift coefficient curve. Indeed, the Fokker three-engine airplane, equipped with such a wing made sensational trials during last year's air races, demonstrating how gently it recovers from the stall.

Holds Normal Elevator Satisfactory

Thus we see that the control surfaces of the properly balanced airplane do not behave during the stall in such an atrocious manner as Mr. LePage indicates, and in reality they are quite satisfactory. It is true that the pilot loses his control, but this only to the extent of not being able to keep the airplane at an angle of attack above stalling. In practical flying we are really not interested in this portion of the control, and are quite satisfied, if the controls allow us to regain the normal flying speed. As a matter of fact, in the case of the amateur pilot, it is of some advantage *not to be able* to keep the airplane at the angle of attack above the stall. In this respect our present elevators, operating together with the natural tendency of the machine, are quite satisfactory.

So we see that our tail planes do not stall when the wing stalls, at least, when they are fitted to the correctly balanced airplane. There may be cases, however, when the tail plane may be stalled because of the sudden action of the pilot. There is no danger of this in the correctly designed tail plane with the elevator forming the trailing edge of the stabilizer and equal to about 30% of the total tail plane area. As long as the stabilizer remains at a reasonable angle of attack as it does according to the explanation given above, even extreme movements of the elevator will not cause it to burble. When the tail plane, however, is composed of a single movable surface, quick movement of the controls may place it at an angle of some 30 deg. to the wind, which is clearly way beyond the burbling point. Such a sudden forward movement of the control stick will actually cause a decrease of lift of the tail plane, and may result in stalling the entire airplane. Again, in this case, the airplane with the center of gravity located far aft is more likely to run into trouble, than one with the center of gravity located forward. Such elevators were fitted to the Moran Saulnier airplanes of 1914, and probably are responsible for the very large number of tail spinning accidents observed, even with experienced pilots, on these machines. Unfortunately even now we see this type of tail plane often fitted to gliders, where it is least suitable, considering that gliders always fly at angles of attack very near to the stalling.

Lateral Control

Let us consider now the control of our airplane in roll after the stall. As one wing drops down, its downward velocity combined with its forward velocity causes increase of the angle of attack. At the angles beyond stalling, the increase of the angle of attack leads to the *decrease* of the lift, and the angular motion of the airplane continues,—the phenomenon generally known as *autorotation*. It is evident that, were our airplane equipped with wing warp for lateral control, the operation of this warp at the stalling angle will provoke the autorotation, and consequently would cause the tail spin to develop. With the ailerons, the conditions are fortunately different. Experiments made on model airfoils equipped with the flaps along their trailing edges show us that the critical angle measured with respect to the fixed surface does not vary appreciably even with extreme movement of the flaps*. Even at angles of attack beyond stalling, putting the flap down increases the lift somewhat, although very little. Fig. 3, taken from the book, "Simple Aerodynamics", by Monteith, shows the rolling moment due to the ailerons of a model airplane as determined by Prof. E. P. Warner in the M.I.T. Laboratory. We will observe that the ailerons decrease in effectiveness from the small angle of attack to about 16 deg., which is presumably the critical angle of attack for this model, but even up to 28 deg. they have some effect and do not reverse. Thus we see that although ordinary ailerons at the angle of attack beyond stalling have rather weak effect, the effect is still present, and the ailerons cannot be blamed for starting the autorotation.

The effectiveness of the ailerons at stalling angle depends somewhat on their plan form, and can be improved by giving the center line of the aileron hinges an angle "sccw" of some 15 deg., as was shown by wind tunnel experiments made at McCook Field†, and very well explained by Dr. Munk.

Effect of Rudder

The aileron put down has more drag than the aileron put up, and, therefore, the operation of ordinary straight ailerons causes the airplane to yaw in the direction of the lowered aileron, as Mr. LePage justly observes. The rudder of an airplane should be, and usually is, designed to be powerful enough to overcome this tendency. Indeed, in most of the present day airplanes it is quite possible to reverse the direction of the tail spin by quick action of the rudder. We will remember that effectiveness of the rudder and fin diminishes only as the flying speed diminishes, but is not affected in the least degree by the burbling of the wing. As a matter of fact, quicker yaw can be produced by rudder at low speed than at high, because at low speed the damping is much weaker.

Quick action of the rudder causes the machine to yaw, and makes one wing travel through the air faster than the other. The wing moving faster acquires more lift and rises. This effect of the rudder—roll due to yaw—is more pronounced, the lower is the flying speed, and furnishes the pilot with excellent means of control of the roll at the angles of attack above stalling.

Lateral Control Devices

We said that ordinary ailerons cause the airplane to yaw in the wrong direction, and, therefore, detract from the effectiveness of the rudder. There are, however, two simple and well tried modifications of the ordinary ailerons, which

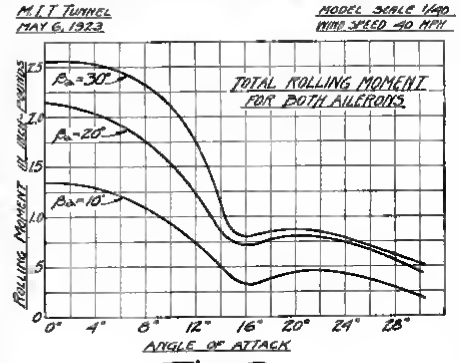


Fig. 3.

cure this trouble. These are washed out ailerons, such as were used on most of the German airplanes, and the differential aileron control invented by Captain DeHavilland. Both of these devices result in decrease of the drag of the lowered aileron, as compared with ordinary ailerons, and cause increase of drag of the raised aileron. Indeed, differential ailerons act in way as wing tip brakes, partially replacing the action of the rudder. Thus we see that the ailerons with the hinges placed at a certain angle of "sccw" and equipped with differential control, will work satisfactorily even at angles of attack above stalling, giving, as they do, fair rolling moment and yawing moment in the correct direction, i.e. provoking further increase of rolling moment due to yaw. Such ailerons, being quite efficient at low speeds, are efficient also at high speed, inasmuch as when only slightly displaced they do not cause any appreciable increase of the wing drag. The drawback to most of the control arrangements proposed by Mr. LePage is that even at small displacements they affect adversely the efficiency of the wing. We must not forget that, while the controls must be effective after the stall, by far the largest part of their service is used in normal flight, and their efficiency under normal conditions should not be sacrificed too much.

* A.C.A. Rep. and Memo. No. 319.

† McCook Field Serial Report No. 2552.

Duggan Reaches Dutch Guiana

June 11 found Bernardo Duggan, the Argentine flier, at Paramaribo, Dutch Guiana, after a week of storms and delays. The flight from San Juan, to Fort de France was an experience with the usual headwinds, rain squalls and rough seas, encountered in refuelling at Basse Terre. Fort de France was reached in 1 hr. and 30 min., the fliers leaving this point at daybreak June 6, but being forced back to Martinique, after a short flight, because of weather conditions. They remained there until June 8, when conditions permitted them to break the two day halt and reach Port of Spain, Trinidad, where an enthusiastic welcome awaited them. At this place it was decided to make a change in the itinerary, to include a stop at Georgetown, British Guiana, for refuelling.

Leaving Port of Spain in fair weather, the Buenos Aires was hardly out of sight of land when the worst storm of the flight was encountered. The wind necessitated the seeking of a lower altitude, although the storm was just as violent a few meters above the sea. At 2:45 p.m., June 8, the Buenos Aires left Nickerie, where it had landed because of the storm, arriving at Paramaribo at 4 o'clock.

Air Service Training in the Army

War Department Memorandum Provides for a Better Understanding of Air Service Possibilities Throughout the Army.

REALIZING THE importance of the Air Service to the numerous functions of the Army, the War Department, on May 25, 1926, issued a statement outlining the general policy to be adopted in the Army with regard to instruction in the capabilities of the Air Service. The memorandum is addressed to "All Corps Area and Department Commanders, all Chiefs of Branches, all general and Special Service Schools, and Commanding Officers of all other exempted stations."

Introducing the new policy of the War Department in this respect, the memorandum states, "There is an obvious need for greater knowledge on the part of officers of the Regular Army of the capabilities and limitations of the Air Service, including a limited amount of actual experience in the air. To provide for the acquisition of this knowledge and experience, the following general policy is announced for the information and guidance of all concerned, together with an outline of measures for putting the policy into effect." Thereafter, complete details are given under then respective headings, with a full synopsis of each, of the training policy.

"Aerial Experience" will involve ten hours in the air with a view to giving the student sufficient actual flying, with a qualified pilot handling the plane, to accustom him to being in the air, to enable him to learn what can and what cannot be seen from an airplane, to have demonstrated to him, in the air, the methods of following a given route by map; to lead him to a point where he can direct his pilot over a given route, and to enable him to study the peculiarities of the terrain as viewed from the air.

Military Academy Course

The course in Air Service training for cadets of the United States Military Academy will comprise (1) Theoretical ground course. (2) Theoretical and practical course at a flying field for 1st Classmen.

Item (1) involves a complete coverage of simple aerodynamics and the airplane, under the following headings (in the memorandum each heading is followed by a complete 'textbook' synopsis):

Nomenclature, introduction, the airfoil, criteria for the selection of airfoils, airfoil combinations, parasite resistance, the complete airplane, stability, the control surfaces, the propeller, performance, factors affecting performance, dynamic loads, maneuverability and controllability, constructural considerations, the military airplane, problems, tactics, theoretical.

With the exception of the last item, the above matter will cover approximately eighteen regular recitation assignments, each of 1 hr 25 min. duration, with approximately two hours study period for each assignment. "Simple Aerodynamics and the Airplane", by Monteith; "Problems in Simple Aerodynamics", by Monteith, other standard works on aerodynamics, Air Service Information Circulars, and N A C A. Reports will form the text book for this course.

The item "Tactics, theoretical" includes a complete discussion of the Air Service as one of the Combat Arms. This includes Observation, Pursuit, Attack, and Bombardment. Division Air Service will be discussed in conjunction with Division Engineer, Motor Transport, and the Medical Regiment. During this period, the Air Service will be discussed with respect to its general powers, possibilities, and limitations, with special reference to Observation Aviation and Division Air Service.

Item (2), *Theoretical and practical course at a flying field*, involves a period of five days spent at a flying field studying the technique and tactics of the Air Service. A specific number of hours during this period are allotted to such subjects as Armament, Photography, Navigation, etc., etc.

The courses in Air Service training at Special Service Schools involve the following: Infantry, Cavalry, Field Artillery, and Coast Artillery Schools, Tank Corps, Signal Corps and Engineer Corps, Chemical Warfare Service, and Quartermaster Corps. An individual number of hours is allotted to each school. The training in these cases is of a very general nature, outlined to prepare student officers for pursuing intelligently, at a later date, the course in "Aerial Experience". (to be described in detail later).

Command and General Staff Training

The course in Air Service training at the Command and General Staff School will comprise (1) Ground Course, involving Navigation (10 hr.) and Meteorology (15 hr.), and (2) Flying Course involving seven flights (total 10 hr.), each flight with some precise navigational purpose in view.

Aerial Experience Course

The course in Aerial Experience, to which reference has already been made will now be discussed. This course is primarily for commissioned officers of the combatant branches, of less than fifteen years commissioned service, who have not otherwise had the air training, as previously outlined, as recently commissioned graduates of the United States Military Academy.

The course in Aerial Experience for this category of officers will comprise a Ground Course involving Navigation (10 hr.) Meteorology (15 hr.), Gunnery (5 hr study, 10 hr practical) and Aerial Photography (8 hr.), and a Flying Course of 10 hr., divided into eight flights, each with a precise navigational and gunnery object in view.

The chiefs of the respective combatant branches, in cooperation with corps area and department commanders and with the Chief of Air Service, are charged with the accomplishment of this Aerial Experience Course just outlined and, for this training, a list of flying fields is given in the memorandum.

Furthermore all recently commissioned officers who are graduates of the United States Military Academy will, immediately upon graduation leave, be sent to an Air Service field to pursue the course in Aerial Experience, as in the case of officers of less than fifteen years experience, already mentioned.

This course in Aerial Experience is also to be taken by Corps Area and Department Commanders, in cooperation with the chief of Air Service, a list of fields for this purpose being given.

Stating, with special exceptions, that until legislation provides for extra hazard compensation, none of the afore mentioned courses shall take effect and that the courses shall be further curtailed to an extent outlined, until funds are available for operating the aircraft involved, the War Department memorandum closes with the signature of Maj. Gen. Robert C. Davis, Adjutant General. This memorandum indicates the definite recognition by the War Department of the need for an accurate understanding of Air Service functions by the various other branches of the Army.

Sleeve Valve Plane Engines

The Minerva Company of Belgium has brought out an eight-cylinder 150 hp. aircraft engine with sleeve valves. This is said to be an experimental model which is to serve as the basis of the design of a projected 12-cylinder 600 hp. engine. The most interesting feature of the present engine is found in the construction of the cylinders and valves. Each cylinder block is of Alpax metal, and running direct on the Alpax surface are the outer sleeve valves, which are made of bronze. Next to these come the inner valves the material of which is heat-treated chrome nickel steel, and inside again are the pistons, which are of aluminum alloy. The weight of each sleeve is given as 4.51 lb. for the inner, steel, type, and 3.71 for the outer, bronze, type. Two eccentric shafts operate the sleeve valves, each being mounted in five aluminum alloy bearings, and these are placed along the top of the crankcase between the banks of the cylinders.

Poor Fuel Used By Detroit-Arctic Expedition

Investigation by the Wright Aeronautical Corp. of press comments that insufficient power was furnished by the Wright Whirlwind engines of the three-engine Fokker plane of the Detroit-Arctic Expedition, has resulted in a complete vindication of the company's claim that its engines functioned 100 per cent and has revealed the cause that gave rise to these stories.

The Wright engineer, Andrew Hufford, who accompanied the expedition, has reported that automobile gasoline was used instead of aviation gasoline at the time that the engines were not up to their standard in power. The Wright Whirlwind engine is designed to operate on high test fuel and when lower grades of fuel are used, a resulting loss of power takes place.

Upon the return of the three-engine plane from Point Barrow to Fairbanks, Alaska, the engineer drained the automobile gasoline and used the proper aviation fuel. The engines then turned 1600 r.p.m. on ground, whereas they had only turned 1500 r.p.m. in the air at Point Barrow, due to the low grade of fuel used.

Instructions, specifically outlining the above facts, were sent to the expedition and the Wright Aeronautical Corp. have telegraphed to Edward S. Evans, General Manager of the Detroit-Arctic Expedition, at Detroit, for a complete retraction of stories circulated in the American press.

Air Service Parachute Tests

The parachute and armament departments of the Air Service Technical School at Chanute Field, Rantoul, Ill., have been experimenting with a new system for testing service type parachutes. The results to date have been successful and proves to be an improvement over the methods used before. The work in testing is greatly facilitated, much time is saved, and the parachute is required to meet actual conditions and strains that would be encountered in an emergency jump by a flier.

The new method employed consists of dropping two dummies (or four could be used if desired) from the bomb racks located on each wing of a Douglas O2 observation plane. Two dummies were especially constructed under the direction of Tech. Sgt. Wilson for this purpose. The dummies, with parachutes attached, are fastened to the bomb rack under each wing, in the same manner that a bomb would be carried. The rip cord of the parachute is tied to the wing with a cord seven feet long.

In the actual test, the pilot obtains the desired speed of the airplane for testing the parachute, then releases the dummies from the bomb racks simultaneously (or alternately, if desired) with the aid of the bomb release handle in the cockpit. After the dummies have fallen from the plane the length of the cord tied to the wing, the rip cord, if pulled, releases the parachute from the pack. The pilot can observe the action of one parachute and the observer the other.

By both parachutes being released at the same time a close comparison can be made in the action of the two parachutes checking the opening speed and the rate of descent with one to the other. The rate of opening has not varied one-fifth of one second in any parachute tested to date.

These parachutes have been tested at an altitude of 100 ft. and found to open and land very successfully which proves the speed and reliability of the Army parachute. Most of the tests were made at an altitude of 400 ft. By this new system, a dual test is made in that the bomb racks are tested along with the parachutes.

The Army Air Service uses exclusively the Irvine Air Chute parachute and it is presumably with parachutes of this type that the tests are made.

Aviator's Preparatory Institute

Walter Hinton, a former naval lieutenant and pilot of the NC-4 on its flight across the Atlantic, has opened the Aviator's Preparatory Institute at 475 Fifth Avenue, New York City. The purpose of this institute is to give the potential aviator a comprehensive home study without interferring with his other work. Hinton's course covers sixteen subjects with 216 line sketches and drawings.

The first step toward learning to fly is a thorough knowledge of planes, aircraft engines, construction, instruments, and why an airplane flies. An aviator's success depends mainly on his knowledge of the various subjects covered in this course, prepared by aviators of long experience under the direction of Mr. Hinton and illustrated in such a manner that the average boy with a grammar and high school education could readily grasp the special terms used in aviation.

So thoroughly have these subjects been covered that if the student was to pass a satisfactory examination he should be able to fly after from five to ten hours flight instruction.

Fifty different professions and trades are represented in the aeronautical industry, besides the pilots and mechanics. Any young man may fit himself to enter this new and fascinating industry which is rapidly growing and more men will be required with the development of commercial air transportation lines now under way.

International Newsreel Photo

The Ryan M-1 monoplane (Wright Whirlwind) in which Pilot Lee Sheenhair made a non stop flight from Portland, Ore., to Los Angeles, Calif., a distance of 1050 miles in 8 hr. 50 min., which indicates an approximate average speed of 117 m.p.h. The plane carried 900 lb. of useful load on the flight.

Pinedo Favors Seaplane

That, taken all round, the seaplane holds distinct advantages over the airplane, was the conclusion of the Marchese di Pinedo, who carried out the successful flight from Rome to Tokyo and back last year. Lecturing before the Royal Aeronautical Society, he explained the three big drawbacks for airplanes as being the difficulty of having airdromes near large centers, much time being consumed in getting to and away from them by motorcar, the cost of construction and upkeep of these airdromes, and the difficulty of acquiring and the cost of organization of emergency landing places.

If the organization of landing places for the operation of commercial air lines is badly carried out or lacking, these difficulties are increased. It was noteworthy that during flights such as that made by the U. S. Army fliers around the world, the normal airplane landing gear had to be replaced at times by floats.

If one looks at the map of Europe, said the Marchese, one can see that all important political and commercial centers are on the coast or on the banks of large rivers or water-ways, on which alighting by a seaplane is easy. London, Rome, Paris, Berlin, Vienna, Budapest, Copenhagen, Leningrad, Oslo, Stockholm, Constantinople—all these offer water facilities allowing passengers and cargo to be discharged near the center of these cities.

This does not apply to Europe only, but to the whole world. Any piece of water long and broad enough to allow a seaplane the length to take for its take-off, sufficiently sheltered, and five feet or more deep, is good enough for the largest seaplane. So it may be said that alighting places already exist in all important centers of the world, being the natural results of the organizations of many hundreds of years of human labor.

The only necessity as regards space in an airport is a length of from 300 to 500 yards to accommodate the taking-off and alighting runways; and as harbor traffic is always moving this can always be arranged.

His own journey to Tokyo by seaplane showed the possibility of traveling round the world. It was even possible to descend with a solidly constructed seaplane onto land. He had done so two years ago in Holland, when he landed on meadow land, transported his machine to water again, and resumed his journey back to Italy. A seaplane tends to somersault less than an airplane when making a forced landing, though, of course, she has to be taken to water in order to get into the air again.

The Marchese claimed that his 33,000 mile journey proved that he could carry a useful load of a ton, and that, fitted with sails, and barring a rough sea, it could sail well enough to give a good chance of reaching land. For drinking water in such an emergency he carried a small condenser.

The Marchese foresaw large and powerful planes for water navigation, carrying sails for emergencies. There will, he said, be piers for seaplanes in all harbors, for landing and embarking, and the longest land voyages will only take a few days.

International League of Aviators Opens

The Vielles Tiges, the official organization of French aviation pioneers and the International League of Aviators, of which Mr. Clifford Harmon, the American flier is president, opened their club house and headquarters at the Clos Normand, in the Bois de Boulogne, Paris, May 13. Aviation notables from many nations were present and a luncheon was tendered to press representatives, comprising all correspondents of foreign newspapers in Paris, as well as French. On May 14 a reception was held for the various diplomatic corps stationed in Paris.

The club is easily reached by Paris subways as well as several lines of buses and street cars. It is surrounded by large shade trees and has a considerable area on three sides, which has been converted into a garden. A large reading room is located on the first floor where can be found aeronautical publications from all parts of the world. Stenographers proficient in languages are in attendance and every comfort has been installed to make this a center for international aviation.

d'Orcy Secretary of International League of Aviators

Ladislas d'Orcy, for several years Editor of AVIATION, is now Secretary of the International League of Aviators, recently organized in Paris. The League has posts in twelve countries, and hopes to obtain the approval of the League of Nations, with the aim to group all the airmen of all countries into a fraternity.

New American Spherical Balloon Records

New American Records for Spherical Balloons have been recognized by the Contest Committee of the National Aeronautic Association, as follows:

CLASS A—Balloons
2nd Category (1001-1800 cu. meters)
(21224-31783 cu. ft.)

DURATION
W. C. Naylor and K. W. Warren, "Skylark", Little Rock, Ark. to Crawford, Tenn., Apr. 29-30, 1926 — 19 hr.
Former Record
None

DISTANCE
W. C. Naylor and K. W. Warren, "Skylark", Little Rock, Ark. to Crawford, Tenn., Apr. 29-30, 1926 — 660 km. / 410 mi.
Former Record
None

In accordance with Art. 111 of the F.A.I. Regulation "A Record made by an aircraft of Class A (Free Balloons) shall be broken when a balloon belonging to the same or to a lower category shall have made a better performance." The following records are recognized:

CLASS A—Balloons
3rd Category (1801-3200 cu. meters)
(31818-42377 cu. ft.)

DURATION
W. C. Naylor and K. W. Warren, "Skylark", Little Rock, Ark. to Crawford, Tenn., Apr. 29-30, 1926 — 13 hr.
Former Record
Duration
H. V. Thaden and W. A. Morton, "Detroit" Washington C. H. Ohio to Gondola, Va., Sept. 30-31, 1924 — 13 hr.

DISTANCE
W. C. Naylor and K. W. Warren, "Skylark", Little Rock, Ark. to Crawford, Tenn., Apr. 29-30, 1926 — 660 km / 410 mi.
Former Record
Distance
H. V. Thaden and W. A. Morton, "Detroit" Washington C. H. Ohio to Gondola, Va., Sept. 30-31, 1924 — 490.8 km / 305 mi.

Turbulence in Wind Tunnels

A report, entitled "Investigation of Turbulence in Wind Tunnels by a Study of the Flow about Cylinders", has been issued by the National Advisory Committee for Aeronautics, whose investigation on this subject has been carried on for the past year with the assistance of the Bureau of Standards.

Two methods of making such studies are described in this report, together with the results of the use in the 54 inch wind tunnel of the Bureau of Standards. The first method consists in measuring the drag of circular cylinders, the second in measuring the static pressure at some fixed point. Both methods show that the flow is not entirely free from irregularities.

A copy of the report, No. 231, may be obtained from the Committee, at Washington, D.C., upon request.

Range and Endurance of Airplanes

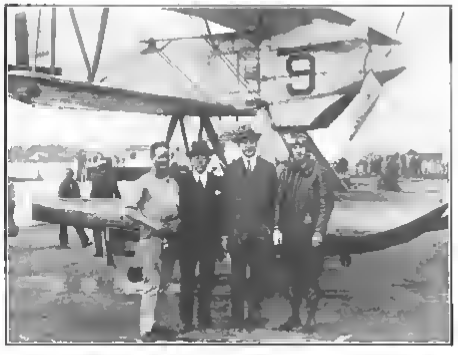
Report No. 243, by Walter S. Diehl, which was prepared for the National Advisory Committee for Aeronautics, develops new equations which give the range and endurance of airplanes with accuracy equal to that obtained from a step-by-step integration of the flight. A method of obtaining equally satisfactory results from Breguet's equations is also given in detail. A third method of calculating range and endurance, derived by the writer for use in routine estimating in the Bureau of Aeronautics, is also given in full. It contains tables and curves arranged for convenient use and illustrates the three methods by comparative estimates. This report may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Curtiss Marine Trophy Results

The Curtiss Marine Trophy Race was held off Haines' Point, opposite the Naval Air Station, Anacostia, D C, over a course 73 1 miles in distance, on May 14. The race, which consisted of groups classed as to the type of planes competing, was well attended. The groups competing were as follows

Group No. 1—F-5-L flying boats (patrol),
" No 2—H-16 flying boats (patrol),
" No 3—UO and SC-6 seaplanes (observation),
" No 4—F-6-C seaplanes (pursuit)

Group No 1 was won by Lieut L W Curtin, U S N., time 59 34 6, 74 30 m p h Group No 2 was won by Chief Boatswain W C Fitzpatrick, U S N., time 56 55 2, at 77 477 m p h Group No 3 was won by Lieut F H Conant, U S N, time 42 21 4, at 104 115 m p h Group No 4 was won by Lieut T P Jeter, U.S.N., time 33 41, at 130 94 m p h



Underwood and Underwood
Left to right: Lieut F H Conant, winner of Class 3 race, Asst Secretary of the Navy Theodore D Robinson, Secretary of the Navy Curtis Wilbur, and Lieut T P Jeter, winner of the Curtiss Marine Trophy

Lieutenant Jeter was presented with the Curtiss Marine Trophy by Assistant Secretary of the Navy Robinson Each winner of the various groups was presented with gold watches given by the *Washington Evening Star*

The Curtiss Marine Trophy was offered by Glenn H Curtiss in 1911 to stimulate interest in seaplanes and flying boats The trophy is awarded to the Aero Club represented by the pilot of the winning machine, this club to have possession of it until one month prior to the next succeeding contest, at which time the trophy shall be returned to the National Aeronautic Association. The first contest was in 1915 and was won by Mr Oscar A Brindley. Except for the years 1921, 1923, and 1925, the trophy has been competed for each year since the first race.

It first came to the Navy in 1919 when Lt Thomas C Rodman, in an H 16 boat seaplane flew a distance of 970 1 miles at Pensacola, Florida. Since that time it has been won by Lieut Dave H McCulloch, Lieut A W Gorton, Lieut F W Grant, and recently, Lieut Thomas P Jeter.

Detroit-Grand Rapids Mail

Acting Postmaster General Bartlett recently issued an advertisement inviting proposals for the operation of a contract air mail route between Detroit, and Grand Rapids, Mich, and return with such intermediate stops as may be agreed on later

This action supersedes the advertisement of May 25, 1926 for this route, and is due to the action of Congress fixing the rate of not more than $3 per pound for the carrying of air mail instead of granting the contractor not more than eighty per cent of the revenue for transporting the mails. In other words, the mail will be carried on a weight instead of a count basis on this route.

Bids will be received at the Department in Washington until noon of July 26, 1926

"Side Slips"

By ROBERT R. OSBORN

When one stops to think it over it is surprising that a business as romantic and colorful as aviation should indulge in advertising so prosaic and commonplace Looking through the pages of this magazine you will see that the manufacturers who have airplanes for sale give all sorts of statistics on high speed, stalling speed, climb, range, capacity and other data along this line Outside of an occasional statement that the particular airplane being advertised is undoubtedly the best in the world, no other claim is made for the machine. In ten issues of AVIATION or any other aeronautical magazine there would probably not be a single picture of a pretty girl! In their rush to get out good machines the manufacturers are neglecting their advertising shamefully,—they are forgetting the definition that "Advertising is a picture of a pretty girl eating, drinking, using or holding something you wish to sell"

If we should follow the apparently successful lead of the automotive industry our magazine would be full of slogans like these—"Would you care to have your daughter seen in an airplane not equipped with Scintilla Magnetos?" "Wear Smith's helmets They give you that devil-may-care expression that makes anyone look like a pilot" "Irvin Parachutes,—the latest thing for light fall wear." "A Curtiss-Reed Propeller What better gift for your son when he graduates from college?"

No one really cares whether a flying suit is warm or not,—the point is will it photograph well? And what good is performance in an airplane if it doesn't look well when parked in front of one's home? Why bother so much about the accuracy of instruments if they can be made with hand-wrought gold cases and mounted with plenty of jewels? The wrong points are being stressed in our aeronautical advertising we fear.

* * *

Every year at The Auto Show in Philadelphia there used to be a dignified elderly salesman connected with the display of a certain steam car. Each time we would ask him the same question and always got the same answer "How gently can you start this car?" we'd say to him, "Does it jump and jerk at low speeds?" "Sir," was the answer, "this car will leave the state of rest and assume the state of motion so imperceptibly as to be almost invisible to the naked eye" We think it would be well worthwhile for any manufacturer to hunt up this old chap and get him to write some copy He wouldn't be guilty of a prosaic statement that a plane will fly "hands-off". He might say, "If at any time during flight one should desire undisturbed rest, to dine with one's guests in the beautifully appointed cabin, or perchance to take a refreshing shower in the cool bathing cabinet, the assurance would be complete that not an iota of deviation from the prescribed course would occur."

Honesty in advertising should be the best policy in "this airplane business" as well as in any other line. A few weeks ago in New York we passed a crowded clothing shop of obviously Jewish management, which had a large sign out stating that "All of our goods are reduced in price from ½ to ⅓ per cent". In Philadelphia on Market Street is an haberdashery having an electric sign over the sidewalk stating "G————'s Shirts Open Evenings", which we would take to be a rather doubtful quality to have in a shirt, but the store seems to get plenty of business One restaurant keeper we patronized did not hesitate to give a frank opinion of his customers,—having lettered on his window "Tables Reserved For Ladies, Oysters and Clams"

On this same basis, some airplane builder might sell thousands of machines by some frank statements like the following in his advertisements,—"Fly our airplane once and you'll never fly another", "The gasoline tank in our machine has proven itself crash-proof hundreds of times." or "Our plane was flown exclusively by the late John Jones."

Commercial aviation may be well "on the way", but it certainly can't be said to have "arrived" until it employs more artists and pretty girl models than the automobile industry.

AIRPORTS AND AIRWAYS

San Diego

Thomas Mathews

Commercial fliers and enthusiasts are just beginning to realize that they have the most wonderful air in the world to fly in and the flitting activities are in full swing. New planes at the present time are grabbing all the spot-light, partly due to the success that T. C. Ryan and Co. had with their new monoplane and partly because it is a lot of fun to build one yourself, for somebody else to fly.

The San Diego Airport initiated their new four-passenger cabin Standard by sending it on a 6,000 mile cross-country to New York and return. A full passage has been booked for the return trip and a number of tickets have been sold for between points on the joint East. Olze of the San Diego Airport is flying.

Nick Ciota tired of herding a Jenny around the mud flats and decided to build something in the way of an airplane, himself. The result is a Hisso installed in a re-built Vought fuselage with a couple of lower Jenny wings at a catchy angle out to one side. And darned if the thing don't perform like a pursuit. Good climb, pretty good speed, and good looking, at least the two movie queens I saw climb out of the front cockpit were good looking. Hap Russell does most of the flying for Nick.

The writer had the pleasure of watching the famous three corner combination Ryan to Mahoney to Bowlus test the new Ryan M-1 with a Super-Rhona installation last Monday. It seems that the instructions for running the Super-Rhone were mislaid by the good looking office girls and the result is that only a couple of the seven cylinders were doing their stuff. Even with an 800 r.p.m. engine, however, Ryan pointed the nose skyward, pulled back the stick and watched "terror-firmer" drop away!

Judging from the way the little plane performed with the engine only roving 1000 r.p.m., it should be a veritable helicopter when they finally find the hook of directions.

Guy Cole, former Montana cow-puncher and Ford salesman, is building up a little something with wings out in East San Diego, where men are men. So far the construction details have been carefully guarded; however it is believed that it will have a motor, two wings, fuselage, tail assembly and landing gear. Details on this newest of new production stuff will be forthcoming in an early issue.

Denver, Colo.

C. A. Braukman, formarly with the Air Mail Service, has joined the Alexander Aircraft Co. and will assist in final assembly and flying. Mr. Braukman is an exceptionally competent pilot and is keenly interested in the development of commercial aviation.

J. Don Alexander, president of the Alexander Aircraft Co. and chief pilot Verner, left Danver, May 26, with an Eagle-rock plane for California. From California they will fly North through Oregon, Washington, Idaho and Utah and back to Danver. They will cover 10,000 miles on this trip, making one of the longest flights up to date in the interests of commercial aviation. Sales Manager J. A. McInaney and Bill Gorman are on a similar trip through the middle states. They will make Indiana, Illinois, Michigan and Wisconsin, and will enter the events at the Flint Air Meet, June 3-4-5. H. Mort Fleming of the Flaming Bros. Lumber Company of Denvar purchased a new Eaglerock last week and will use it for pleasure and business flying.

The new mail route hatwean Pueblo, Denver and Cheyenne will be opened with fitting ceremonies May 31. Already tons of letters are on hand for our souvenir seekers and it looks as if it will keep several ships busy hauling tha first day's mail. Plans are being completed for the Mile High Air Meet to be held in Denver, Aug. 1-2-3. Fat prizes are being offered and the committee, backed by the Golden Jubilee Committee, plans to make this the best avent ever pulled in the West.

J. Don Alexander and Chief Pilot Verner, flying an Alexander Eaglerock with 720 lb. of pay load, took off from Denver Wednesday, May 26 for Los Angeles, arriving there Sunday noon after spending several days in cities en route. This, we believe, is the first time an airplane of 90 hp has accomplished this feat of flying over the coast range and desert with so large a pay load. After a week in Los Angeles, attending the M. P. T. O. Convention and demonstrating the Eaglerock to prospectiva dealers and purchasers, the pioneers will fly noeth to Oregon and Washington. We all wish them "Bon Voyage."

Sales Manager J. A. McInaney has appointed Capt. J. A. Yonge of Gary, Ind., as an Eaglerock dealer. Capt. Yonge is an experienced pilot and business man and will visit Denver during the Rotary Convention and fly his new Eaglerock back. He will make headquarters at Gary and work the state from there. J. A. McInaney is making Flint, Mich., for the air races and while there will sign up a dealer for the State of Mich.

Pilot C. A. Braukman of the Alexander Aircraft Co., flew the first mail ship from Denver to Cheyenne Monday night, May 21, 1926. He left Denver at 6:15 P. M. and arrived at Cheyenne at 7:20. He made the return trip Tuesday morning, June 1, and arrived at the studio in time for work at 7:30. Mr. Alexander wrote from New Mexico: "Have not found anyone yet who ever heard of a 90 hp. motor flying over this country. They all gasp when they hear we fly an OX-5 and gasp again when they see her perform with 700 lb. plus of pay load."

An extract from Paul Verner's letter reads: "Everything is fine so far. Very well pleased with No. 113, and am enjoying the trip in every way. Everyone admires the ship and marvels at its ability to carry our present heavy load out of fields of 7,000 ft. altitude. We have covered some bad country with all the confidence of D. H. pilots."

Hartford, Conn., News

By Harry Depew Copland

In spite of continued cold weather, which has been the cause of more than one of the Brainard Field pilots bedecking himself with full winter flying kit, there has been a great deal of both civilian and army flying of late. Aviation enthusiasts in this vicinity should consider themselves very fortunate in the recent appointment to the Field Superintendency of Sgt. E. C. Lindquist, who is unusually well qualified to handle this job. Mr. Lindquist is First Sergeant in the 118th Observation Squadron, C.N.G., served 17 years with the regular army and won a number of decorations while on overseas service.

The City hangar has been greatly improved by the addition of a concrete floor, and ramp resulting in much rejoicing among the civilian commercial pilots. The new buildings of the 118th Obs. Squadron are rapidly nearing completion, and already present a very business-like appearance.

Dr. Francis L. Warren, of Aberdeen, Md., cloud-dispersing expert, has his two Government D.H.s equipped with his apparatus, and Lieut. Louis N. Eller, regular army instructor of the 118th Squadron, has been test flying them. We sincerely hope that Dr. Warren will be successful in ridding this vicinity of some of the clouds which have hung around so persistantly this spring.

Carl Dixon, Earle Fleet, and Johnny Ludig have been forsaking their home base over the week-ends, for more fertile fields for passenger carrying somewhere over the horizon.

Charley Wright, P H Spencer and Ralph Barrows have been taking care of the Brainard Field passengers. Members of the 118th Squadron, C N.G., are stacking up the flying hours with much gusto, in preparation for their summer encampment maneuvers, next month. A great deal of practical work, with keen competition among the flying officers, is being done under the direction of Major Ladd and Captain Warner.

Memphis, Mo.

By Lee R. Briggs

The two day air meet on May 24 and 25, dedicating the Municipal Flying Field was a great success in every way. The weather was ideal and a large crowd was present each day. The object of the meet was to educate the public on flying in general, and air mail and commercial operations in particular. Many people still think that should the engine stop while flying a crash is inevitable. To teach the public that such is not the case, several pilots cut the switch while over the field and made as good landings back on the field as they did with the engine running. Although there was a humpy 18 mile wind blowing, still the spot landings within a few yards of the circle were fairly accurate. The usual stunts were performed to the delight and thrill of the crowd.

The following neighboring pilots participated in the meet: Harold Forrester, Canuck Special, Kirksville, Mo. Leslie Smith, Special Standard, Springfield, Ill. Oren Harwood with a K6 Standard from Lomax, Ill. Glen Romkey, with Laird Swallow also from Lomax. J. H. Livingston from Monmouth, Ill. with Waco. Marie Meyer from Macon, Mo., with OXX Standard with Bobbie Jewell as pilot. E. K. Campbell, with Waco from Moline, Ill. Also the two local ships—Jenny and H-S 6 Standard, owned by Lee R. Briggs, were on the field. On the first day of the meet the air mail east bound landed on the field for a few minutes. This is on the route from St. Joseph, Mo., to Moline, Ill., operated by the N. A. T. The pilot was Robert H. Futt. On the second day both the west bound in the morning and the east bound in the afternoon flew over the field and waved greetings to those present.

Elmhurst, Ill.

The Eagle Flying Field, established in 1924, has changed management. Patrick DeMichelle, an old time experienced promoter, has signed a five year lease with V. Fisher, owner of the field.

The field covers 80 acres, all tile-drained, has a four-way take-off, and is surrounded on all sides by level farm land. Outside of the Air Mail field, it is claimed to be the best flying field within the limits of Chicago.

The exact location of the field is on the Lake Street Highway, about seven miles straight west from the west-side boundary line of Chicago, and about a mile Northwest from the heart of Elmhurst, Illinois.

Flying operations are still under the direction of Pilot J. R. James, who flies a Mountain Oriole, with a C6 engine. Pilot Fred Bouchard, flying a Canuck, and Pilot M. M. Rubner, flying a 5 place Standard, with a 180 hp. Hisso, make up the flying personnel.

At the South end of the field, facing the highway, is a large dance hall and restaurant, seating 100 people; a building housing the repair shop and field managers office, a ticket booth, refreshment stand, open-air barbecue stand, and a regulation filling station, equipped with three gas pumps, one of which is for aviation gas.

Pilot James states that all fliers are welcome to the field at any time, and will be allowed to carry passengers provided arrangements are made in advance.

Richmond, Va.

By E. H. Brochenbrough

J. S. Charles flew his Standard from Richmond to Williamsburg where he received pictures of the President and of the Sesqui-Centennial occasion there and returned to Richmond where he delivered them to the *News Leader* at 10:33 a. m. By 11:30 o'clock he was handed 400 lb. of newspapers to be delivered in Williamsburg. The experiment was a great success and everyone was well pleased.

Our field is Northwest of Richmond, Va., just out of the city limits, and only a half mile from the State Fair Grounds.

Kansas City, Mo.

By R. S. Knowlson

Tempus fugit! So does the air mail. In fact, the regularity with which the Carrier Pigeons of the National Air Transport, Inc., have flown since the opening of the Chicago-Kansas City-Dallas air mail route, May 12, is going a long way to demonstrate to the people of this section of the continent that the airplane is a great deal more reliable than they have believed. To your correspondent, it appears to be a matter of educating the unwitiated that the air mail is reliable and, therefore, a safe method for the rapid transportation of important communications or merchandise. Except upon the day of the inauguration of the line, the mails transported by the planes of the National Air Transport have not been extremely heavy. However, it is encouraging to note that the number of letters and weight of packages gradually is increasing. But that is to be expected and the volume of business, in the form of air mail, will continue to increase as the people generally begin to realize its value. At this writing, every scheduled flight with the mails by the planes of the N. A. T. has been completed. More frequently than not the pilots have landed their planes on Richards Field ahead of time. Such work cannot do otherwise than instill the necessary confidence and eventually the air mail habit in the minds of the people of the Middle West and Southwest.

The Porterfield Flying School, operating on and off Richards Field, plans to commence work on a larger scale within a short time, according to E. E. Porterfield, Jr., head of the school. Twenty-one pupils now are being trained on Standards, but it is the plan of the school, Porterfield declares, to eventually train students solely with American Eagle airplanes. One of these machines has been in operation on the field about a month. It is a machine resembling the Waco, powered with a Curtiss OX-5 engine. Tests with the plane have demonstrated its complete airworthiness and have convinced Porterfield, its builder, that it will have been worth while to manufacture additional planes of the type. The result is that a company, now nearly formed, is expected to enable Porterfield to produce a number of these airplanes. The company, according to present plans, also will operate the school with Porterfield as the active head.

Chicago Municipal Airport

U. S. Air Forces

Bomb Attack on Captive Balloon

An interesting test of the 50 cal. machine gun mounted on a PW-9 airplane was carried out at Langley Field, Va., on April 27. The test, which was carried out by Capt. H. W. Cook, Air Service, was to determine the shooting qualities of the 50 cal. gun at long range. The target used was a type R Caquot balloon flying at 1,000 feet. Five attacks were made from a medium altitude at long range, and the balloon was burned as the result of the fifth attack.

Another attack on a captive balloon was conducted on May 6th by Captain Cook, the purpose being to test the efficacy of the 25 lb fragmentation bomb dropped from a pursuit ship on the target, a Type R Caquot balloon, there being some question as to whether the bomb would detonate on contact with the balloon. Three flights were made by Captain Cook, four bombs being carried on each flight. Most of these shots were over, the balloon presenting a small target and the speed of the ship as a result of the long steep dive being such that the pilot had difficulty in successfully calculating the trajectory of the bomb.

On the following afternoon another attempt was made. The first flight, during which four bombs were dropped, was unsuccessful, but the pilot evidently got his correct firing data, and with the first bomb on his second flight he hit the balloon. After that there was no question as to whether the bomb would detonate. The balloon was a mass of flames in a few seconds after the bomb exploded.

Planes For National Guard

Six airplanes will be delivered to the 103rd Observation Squadron, Pennsylvania National Guard, in the near future. The planes are at Fairfield, Ohio, and will be delivered to Philadelphia, Pa. They will be ferried to the delivery point by Capt. William H. Crom, A.S.; Capt. Charles T. Phillips, A.S., Capt. Donald Wilson, A.S., 1st Lieut. Charles C. Chauncey, A.S., 1st Lieut. Clarence E. Shaukle, A.S.; 1st Lieut. Donald Duke, A.S.; 1st Lieut. Earl J. Carpenter, A.S., and Capt. Edward C. Black, A.S.

Aviation Observer Named

The Secretary of War has recommended to the Secretary of State that Major Barton K. Yount, of the Army Air Service, now on duty as Assistant Military Attache for Aviation at the American Embassy at Paris, be named as observer and authorized to attend a meeting of the Special Committee of Experts which will meet in Paris on May 17, 1926. This committee was organized as a result of recommendations made by the delegates to the International Conference on Aerial Private Rights which met in Paris on Oct. 17, 1925. Major Yount acted as an observer at that meeting.

Jennies for Training

Twenty-four Curtiss JN type airplanes have been shipped by freight from San Antonio, Texas, to Wright Field, Ohio, for use by the Air Service personnel in summer reserve training camps. From Wright Field these planes will be flown to various northern and eastern camps.

Planes Photograph Volcano

When Mauna Loa started an eruption and spectacular lava flow on April 14, Dr. T. A. Jaggar, volcanologist in charge of the Kilauea Observatory, requested that a flight of Army planes be sent to Hawaii in order to locate the source of the flow and obtain pictures of its course. The higher slopes of the big volcano on Hawaii are practically inaccessible by land.

In compliance with Dr. Jaggar's request, the Department Commander authorized a flight of three airplanes to Hawaii. The flight consisted of Lieut. Harold R. Rivers, C.O. of the 11th Photo Section, flight commander and pilot of the photo ship, with Staff Sgt. Robert H. Benson, photographer, Lieut. James D. Givens and Lieut. Glenn Salisbury of the 72nd Bombardment Squadron, as pilot and observer respectively, in a DH4B, and Lieut. Everett S. Davis, 4th Obs. Squadron, Wheeler Field, pilot of the Loening Amphibian with Tech. Sgt. Dan H. Dorey as radio operator.

The flight left Luke Field on Saturday, April 17, at 10:00 a.m., and arrived at the Upolu Point Field on Hawaii at 12:10 p.m. When all planes had been serviced, the flight proceeded to the South Cape Landing Field, which was only a few miles from the lava flow. On the flight to South Cape pictures of the flow were taken, the most noteworthy being those showing the huge flow approaching the village of Hoopuloa.

Sunday morning several flights were made, photographs being taken of the flow from its source to its terminus at the sea, of the burning of the village of Hoopulua, of the lava flow into the sea, and of portions of the flow on the mountainside.

The flight returned to Luke Field via Upolu Point on Monday, the personnel reporting that although operating under very adverse conditions the mission was successful. The Standard Oil Company furnished gasoline to the planes, although they had refused gasoline to hundreds of civilian motorists who had come to the scene of the flow. This gasoline was especially appreciated, since it made possible flying operations from the South Cape Field instead of from the Upolu Field. South Cape was only twenty miles from the flow while Upolu Point was over a hundred.

During their stay at South Cape the flight personnel had the experience of "roughing it". Water was very scarce, food at a premium, shelter of any kind difficult, and the nearest telephone miles away. One member obtained a cot while the others slept either on a floor or the ground.

The taking of these aerial photographs was especially difficult, not only on account of the intense heat from the lava but also because of the extremely rough air. All the pilots reported that directly over the lava stream the air was comparatively smooth, but on either side for a short distance the air was so bumpy that it was difficult to keep the plane under control. A very interesting spectacle occurred when the lava hit the water. A steam cloud shot up to a height of about a thousand feet and then apparently floated up the wind.

As soon as the planes returned to Luke Field, at about 4:00 p.m., the Photo Section, under Master Sergeant Loupos, started work on the development and printing of the pictures. The first finished prints were obtained about midnight and featured an entire front page of the morning edition of the Honolulu *Advertiser*.

Aviation Helps San Diego's Water Problem

The Naval Air Station at San Diego is cooperating with the City of San Diego in solving the water resource problem. Navy airplanes have made thorough investigations and obtained splendid photographs of San Diego's back country. Photographs were made in particular of the streams in the vicinity of Pamo, San Vincente and El Capitan dam sites.

Army Air Orders

Capt. Lowell H. Smith, A.S., San Diego, to San Francisco, sailing July 23 for Hawaiian Dept.

Sec. Lieut. Rinaldo Van Brunt, A.S. (Inf.), Kelly Field, to Fort Sam Houston.

Capt. Ivan B. Snell, A.S., Brooks Field, to Kelly Field.

Sec. Lieut. Thaddeus E. Smyth, A.S., Kelly Field, to Fort Sam Houston.

Capt. Lloyd N. Keesling, A.S., Mitchel Field, to Fitzsimmons Gen. Hosp., Denver, for observation and treatment.

Capt. Laurence F. Stone, A.S., McCook Field, to Langley Field.

Sec. Lieut. Ralph A. Snavely, A.S., upon completion of tour of foreign service, to Brooks Field.

First Lieut. Ray G. Harris, A.S., upon completion of tour of foreign service, to Marshall Field.

Following officers, A.S., upon completion of tour of foreign

service, to stations indicated. First Lieuts. Clarence E. Shankle, Langley Field, Irwin S. Amberg, Selfridge Field, Francis P. Brooker, Kelly Field, Edward A. Hillery, Langley Field.

Capt. Clinton F. Woolsey, A.S., McCook Field, to New York City, sailing Dec. 2 for the Canal Zone.

First Lieut. John D. Corkille, A.S., Brooks Field, to San Francisco, sailing Oct. 29 for Philippine Islands.

Sec. Lieut. Joseph H. Hicks, A.S., Marshall Field, to San Francisco, sailing Sept. 30 for Hawaiian Dept.

Following officers, A.S., from stations indicated to New York City, sailing Sept. 2 for the Canal Zone. First Lieuts. Edward D. Jones, Kelly Field, William B. Souza, Kelly Field, Pardoe Martin, Brooks Field, Dwight J. Canfield, Kelly Field.

First Lieut. William V. Andrews, A.S., detailed as A.S. instructor, Tenn. Nat. Guard, Nashville, upon completion of tour of foreign service.

Sec. Lieut. Paul W. Wolf, A.S., Brooks Field, to San Francisco, sailing Aug. 20 for Philippine Islands.

Navy Air Orders

Lieut. James A. Martin det. U.S.S. Wright, to Nav. A. Sta., San Diego.

Lieut. (jg) William P. Davis det. VO Squad. 6 (U.S.S. Wyoming), Aircf. Squad., Sctg. Flt., to U.S.S. Utah.

Lieut. (jg) Max M. Welborn det. VO Squad. 6 (U.S.S. Utah) Aircf. Squad., Sctg. Flt., to U.S.S. Wyoming.

Comdr. Noel W. Grant det. Navy Yard, Mare Is., to Aircf. Squad., Battle Flt.

Comdr. William W. Lamar det. Aircf. Squad., Battle Flt., to Navy Yard, Norfolk.

Lieut. Comdr. Glenn A. Smith det. Aircf. Squad., Sctg. Flt., to Off. of Nav. Oper., Navy Dept.

Lieut. Clifton A. F. Sprague det. Nav. A. Sta., N.O.B., Hampton Roads, to U.S.S. Lexington.

Lieut. William J. Slattery det. U.S.S. Neches, to Nav. A. Sta., Pensacola.

Lieut. (jg) Joseph F. Bolger det. Aircf. Squad., Sctg. Flt., to staff Aircf. Squad., Sctg. Flt.

Lieut. (jg) Charles R. Brown det. Aircf. Sctg., to staff Aircf. Squad., Sctg. Flt.

Lieut. (jg) Harold E. Parker det. U.S.S. Cincinnati, to Nav. A. Sta., Pensacola.

Ens. Ralph W. D. Woods det. U.S.S. Cincinnati, to Nav. A. Sta., Pensacola.

Ens. Thomas A. Turner det. Nav. A. Sta., Pensacola, to U.S.S. Niagara.

Lieut. William A. Lynch det. U.S.S. Quail to Nav. A. Sta., Pensacola.

Lieut. Robert E. Davenport det. Navy Yard, Washington, to Nav. A. Sta., Lakehurst.

Lieut. Robert W. Fleming det. U.S.S. Arizona, to Nav. A. Sta., Pensacola.

The following Ensigns of the graduating class, Naval Academy, assigned to duty, under instruction in aviation, at the Naval Academy, Annapolis. (see attached list)

THE FOLLOWING ENSIGNS OF THE GRADUATING CLASS HAVE BEEN ASSIGNED TO DUTY UNDER INSTRUCTION IN AVIATION AT THE NAVAL ACADEMY, ANNAPOLIS, MARYLAND.

Charles Adair, Dwight M. Agnew, Lloyd J. S. Aitkens, Donald W. Alexander, William G. Allen, William W. Anderson, Jr., Erasmus W. Armentrout, Robert G. Armstrong, Theodore C. Aylward, Jr., Gerald D. Baker, Howard E. Ballman, Neill K. Banks, Henry Barron, Albert Benjamin, Albert E. Bernet, Jr., Henry E. Bernstein, Joseph L. Bird, Francis L. Black, Hugh D. Black, Richard McF. Boaz, Almerian R. Boileau, Edward J. Boughton, 3rd, Charles A. Buchanan, Vincent R. Burchett, Francis L. Busey, Wilfred Bushnell, Charles L. Boyle, Leonard Branneman, James T. Brewer, Clarence Broussard, Bert F. Brown, James R. Browne, John H. Brownfield, James F. Byrne, Caldwell, Joseph W. Callahan, Donald G. Campbell, Spencer A. Carlson, Charles L. Carpenter, Robert W. Cavenagh, William H. Carpenter, Henri deB. Claiborne, Murray W. Clark, Chester L. Clement, Thomas F. Conley, Jr., William G. Cooper, Clifford T. Corbin, Gibson A. Cox, Kenneth Craig, John J. Crane, George G. Crissman,

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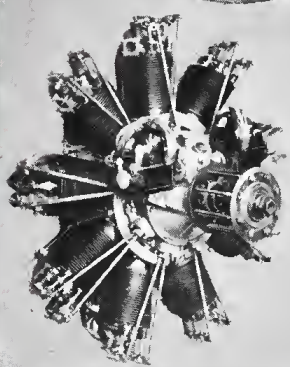

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